# GRADE 4 STANDARDS AND LEARNING ACTIVITIES

**Strand: Number Sense and Operations**

### NUMBER SENSE

**4.NSO–N.1.** Exhibit an understanding of the base 10 number system by reading, modeling, and writing whole numbers to at least 100,000; demonstrating an understanding of the values of the digits; and comparing and ordering the numbers.

*Example: Write the number that has 9 ten thousands, 4 thousands, 8 hundreds, 6 tens, and 2 ones.*

**4.NSO–N.2.** Represent, compare, and order numbers to 100,000 using various forms, including expanded notation.

*Example: Use an appropriate symbol to make this a true sentence.     6,024_____6,936*

**4.NSO–N.3.** Round whole numbers to 100,000 to the nearest 10, 100, 1,000, 10,000, and 100,000.

*Example: Is 70,683 closer to 70,600 or 70,700? Explain your answer.*

**4.NSO–N.4.** Recognize sets to which a number may belong (odds, evens, multiples and factors of given numbers, and squares), and use these in the solution of problems.

**4.NSO–N.5.** Read and interpret whole numbers and decimals up to two decimal places; relate to money and place-value decomposition.

*Example: Write 26/100 and 2-3/4 as decimals.*

**4.NSO–N.6.** Determine if a whole number is a multiple of a given one-digit whole number and if a one-digit number is a factor of a given whole number.

*Example: List the first 5 multiples of 6; determine whether 6 is a multiple of 24.*

**4.NSO–N.7.** Find all factors of a whole number up to 50; know that numbers such as 2, 3, 5, 7, and 11 do not have any factors except one and itself and that such numbers are called prime numbers.

*Example: Create a "Book of Factors" for a given number between 2 and 50. Distinguish prime numbers from composite numbers and cite the difference between them.*

**4.NSO–N.8.** Use concepts of negative numbers.

*Example: The temperature this morning was -6° and now it is 3°. How much has the temperature risen? Explain your answer.*

### FRACTIONS

**4.NSO–F.9.** Demonstrate an understanding of fractions as parts of unit wholes, as parts of a collection, and as locations on a number line.

*Example: What fraction of a pizza will each person get when 3 pizzas are divided equally among 5 people?*

**4.NSO–F.10.** Know the relationships among halves, fourths, and eighths and among thirds, sixths, and twelfths; compare and order such fractions.

*Example: Sam says that 1/3 of an apple pie is less than 1/4 of the same pie. Is Sam correct in his assertion? Explain.*

**Strand: Number Sense and Operations** *(continued)*

### FRACTIONS (CONTINUED)

**4.NSO–F.11.** Recognize, name, and generate equivalent forms of common decimals (0.5, 0.25, 0.2, 0.1) and fractions (halves, quarters, fifths, and tenths) and explain why they are equivalent.

*Examples: Write 25/100 and 1/5 as decimals. Show how 0.20 and 1/5 are the same.*

**4.NSO–F.12.** Select, use, and explain models to relate common fractions and mixed numbers (e.g., 1/2, 1/3, 1/4, 1/5, 1/8, 1/10, 1/12, and 1-1/2); find equivalent fractions, mixed numbers, and decimals.

*Example: Write 23/4 as a mixed number. Explain your answer.*

**4.NSO–F.13.** Represent positive decimals to the hundredths.

### COMPUTATION AND OPERATIONS

**4.NSO–C.14.** Demonstrate an understanding of and the ability to use conventional algorithms for the addition and subtraction of multidigit whole numbers.

**4.NSO–C.15.** Add and subtract up to five-digit numbers accurately and efficiently.

*Example: 45,329 + 6,984 = ?, 36,296 – 12,075 = ?*

**4.NSO–C.16.** Use concrete objects and visual models to add and subtract fractions where the denominators are equal or when one denominator is a multiple of the other (denominators 2 through 12, and 100).

*Example: Use a picture of a circle or rectangle divided into 6 equal pieces to find 5/6 – 1/3.*

**4.NSO–C.17.** Select, use, and explain various meanings and models of multiplication and division of whole numbers. Understand and use the inverse relationship between the two operations.

**4.NSO–C.18.** Know multiplication facts through 12 x 12 and the inverse division facts. Use these facts to solve related multiplication problems and compute related problems.

**4.NSO–C.19.** Demonstrate understanding of and ability to use the conventional algorithms for multiplication of up to a three-digit whole number by a two-digit whole number. Multiply three-digit whole numbers by two-digit whole numbers accurately and efficiently.

**4.NSO–C.20.** Demonstrate understanding of and the ability to use the conventional algorithm for division of up to a three-digit whole number with a single-digit divisor (with or without remainders). Divide up to a three-digit whole number with a single-digit divisor accurately and efficiently. Interpret any remainders.

**4.NSO–C.21.** Multiply fractions by whole numbers, using repeated addition and area rectangular models

*Example: Draw a rectangle 5 squares long and 3 squares wide. Shade 4/5 of the rectangle, starting from the left. Shade 2/3 of the rectangle, starting from the top. Look at the fraction of the squares that you have double-shaded and use that to show how to multiply 4/5 by 2/3.*

**Strand: Number Sense and Operations** *(continued)*

COMPUTATION AND OPERATIONS (CONTINUED)

**4.NSO–C.22.** Mentally calculate simple products and quotients up to a three-digit number by a one-digit number.

*Example:*    *400 x 7*    *320 ÷ 8*    *350 ÷ 7*    *500 x 3*

**4.NSO–C.23.** Multiply and divide money amounts in decimal notation by using whole-number multipliers and divisors.

**4.NSO–C.24.** Determine the unit cost when given the total cost and number of units.

**4.NSO–C.25.** Select and use appropriate operations (addition, subtraction, multiplication, and division) to solve problems, including those involving money.

*Example: Here is a number sentence: 2,000 ____700 + 30 + 9 = 2,739. What operation should go where the blank is to make the sentence true?*

**4.NSO–C.26.** Select, use, and explain the commutative, associative, and identity properties of operations on whole numbers in problem situations.

*Example: Rewrite (5 x 7) x 2 by changing the parentheses. Does it change the answer? Why or why not?*

**4.NSO–C.27.** Use the relationship between multiplication and division to simplify computations and check results.

ESTIMATION

**4.NSO–E.28.** Estimate and compute the sum or difference of whole numbers and positive decimals to two places.

*Example: Estimate and compute the following:*    *$0.43 – $0.29 = ?*    *0.74 + 0.80 = ?*

**4.NSO–E.29.** Estimate the answers to calculations involving addition, subtraction, or multiplication; know when approximation or a rounded solution is appropriate and use it to check the reasonableness of answers.

**4.NSO–E.30.** Select and use a variety of strategies (e.g., front-end, rounding, and regrouping) to estimate quantities, measures, and the results of whole-number computations up to three-digit whole numbers and amounts of money to $1,000 and to judge the reasonableness of answers.

*Example: During a 5-day period, the Department of Public Works hauls 935 pounds of trash to the city landfill. How many pounds of trash are hauled, on average, per day?*

**Strand: Patterns, Relations, and Algebra**

**4.PRA.1.** Create, describe, extend, and explain geometric and numeric patterns, including multiplication patterns; generalize the rule for the pattern and make predictions when given a table of number pairs of a set of data.

*Example: Look at these numbers: 50, 46, 42, 38, 34, 30 … . There are many patterns that can produce these numbers. Describe one. (Teacher follows up with a question about which method is the simplest.) Generalize the rule for the pattern 3, 30, 300, and 3,000.*

**4.PRA.2.** Use letters and other symbols (e.g., ▲, *x*) as variables in expressions and in equations or inequalities (mathematical sentences that use =, <, and >).

*Example: When a certain number is multiplied by 3 and then 5 is added, the result is 29. Let "a" stand for the unknown number and write an equation for the relationship.        (a x 3) + 5 = 29*

**4.PRA.3.** Use pictures, models, tables, charts, graphs, words, number sentences, and mathematical notations to interpret mathematical relationships.

*Example: How many squares make up the surface of each tower of cubes (including the top and bottom)? As the tower gets taller, how does the number change?*
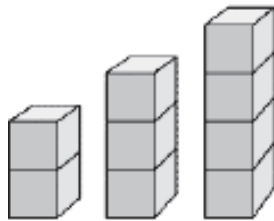


| Number of cubes (N) | Number of squares on the surface |
|---|---|
| 1 | 6 |
| 2 | 10 |
| 3 | 14 |
| 4 | 18 |

**4.PRA.4.** Solve problems involving proportional relationships, including unit pricing.

*Example: Four apples cost 80 cents, so 1 apple costs ? cents; 1 inch represents 5 miles, so 2 inches represent ? miles.*

**4.PRA.5.** Determine how change in one variable relates to a change in a second variable (e.g., input-output tables).

**Strand: Geometry**

**4.G.1.** Compare and analyze attributes and other features (e.g., number of sides, faces, corners, right angles, diagonals, and symmetry) of two- and three-dimensional geometric shapes.

*Example: Describe the attributes and features of two- and three-dimensional geometric shapes.*

| Shape | Dimension | # sides | # faces | # corners | # right angles | # diagonals |
|---|---|---|---|---|---|---|
| Triangle | | | | | | |
| Quadrilateral | | | | | | |
| Circle | | | | | | |
| Rectangle | | | | | | |
| Square | | | | | | |
| Prism | | | | | | |
| Pyramid | | | | | | |
| Cylinder | | | | | | |
| Cone | | | | | | |
| Sphere | | | | | | |

**4.G.2.** Describe, model, draw, compare, and classify two- and three-dimensional shapes (e.g., circles, polygons, parallelograms, trapezoids, cubes, spheres, pyramids, cones, cylinders).

*Example: Create a drawing of two-dimensional shapes and models of three-dimensional shapes. Record descriptions and classify each shape.*

**4.G.3.** Know the definitions of a right angle, an acute angle, and an obtuse angle. Understand that 90º, 180º, 270º, and 360º are associated, respectively, with 1/4, 1/2, 3/4, and full turns.

*Example: Using individual student clocks, record various types of angles using times of the clock. With a protractor, convert the times into degrees in a circle and record your findings. Illustrate the relationship between the following 90º = 1/4 turn, 180º = 1/2 turn, 270º = 3/4 turn, and 360º = full turn.*

**4.G.4.** Describe and draw intersecting, parallel, and perpendicular lines.

*Example:*

Pennsylvania Avenue
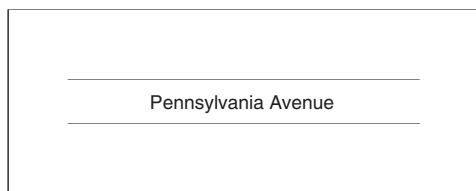
*1. Draw F Street parallel to Pennsylvania Avenue. Write the name F on this street.*

*2. Draw 9th Street perpendicular to Pennsylvania Avenue. Write the name 9th on this street.*

*3. Draw Capitol so that it intersects Pennsylvania Avenue but is not perpendicular to Pennsylvania Avenue. Write the name Capitol on this street.*

*4. Determine what types of angles are present.*

**Strand: Geometry** *(continued)*

**4.G.5.** Recognize similar figures (two shapes, R and S, are similar if they are congruent after one of them is shrunk or expanded).

**4.G.6.** Describe and apply techniques such as reflections (flips), rotations (turns), and translations (slides) for determining if two shapes are congruent.

> *Example: Write a capital N on graph paper using a different color for each line and use a small mirror to reflect the figure. Show your results.*

**4.G.7.** Predict and validate the results of partitioning, folding, and combining two- and three-dimensional shapes.

**4.G.8.** Using ordered pairs of numbers and/or letters, graph, locate, and identify points and describe paths (first quadrant).

> *Example: Plot the points (3, 1), (6, 2), and (9, 3). What do you notice?*

**Strand: Measurement**

**4.M.1.** Identify and use appropriate metric and U.S. customary units and tools (e.g., ruler, protractor, graduated cylinder, thermometer) to estimate, measure, and solve problems involving length, area, volume, weight, time, angle size, and temperature.

**4.M.2.** Carry out simple unit conversions within a system of measurement.

> *Example: Measure the width of a basketball court using yardsticks and meters. Convert the width into feet and inches or centimeters.*

**4.M.3.** Identify time to the minute on analog and digital clocks using a.m. and p.m. Compute elapsed time using a clock (e.g., hours and minutes since …) and using a calendar (e.g., days since …).

> *Example: Maintain an activity log, recording your activities for a 24-hour period. Compute the elapsed time for each event and between events.*

**4.M.4.** Estimate and find area and perimeter of shapes, including irregular shapes, using diagrams, models, and grids or by measuring.

> *Example: Use geoboards and rubber bands to create various shapes, regular and irregular. Using graph paper, record the created shapes and determine the area and perimeter of each.*

**4.M.5.** Recognize that rectangles that have the same area can have different perimeters; understand that rectangles that have the same perimeter can have different areas.

> *Example: Given 12 square tiles, all the same size, describe all the rectangles you can that use all the tiles. Find the perimeter of each rectangle.*

**Strand: Data Analysis, Statistics, and Probability**

**4.DASP.1.** Collect and organize data using observations, measurements, surveys, or experiments, and identify appropriate ways to display the data.

*Example: Conduct a survey to find the favorite movies or computer games of the students in your class. Decide whether to use a bar, line, or picture graph to display the data. Explain your decision.*

**4.DASP.2.** Match a representation of a data set, such as lists, tables, or graphs (including circle graphs), with the actual set of data.

**4.DASP.3.** Compare two data sets represented in two bar graphs, pie graphs, and histograms.

*Example: Gather data about the sleeping habits of students in at least two different grades in your school. Be sure to define your terms. Develop an appropriate way to display the data and discuss conclusions drawn from it.*
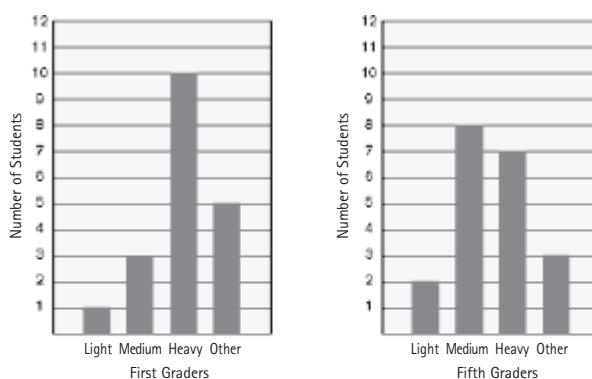


| Type of Sleeper | |
|---|---|
| Light | Wakes up to the slightest noise |
| Medium | Wakes up to louder noises |
| Heavy | Sleeps through the night without waking up |
| Other | None of the previous three |

*(Russel, et al., 1999)*

**4.DASP.4.** Represent the possible outcomes for a simple probability situation.

*Example: What is the probability of drawing a red marble from a bag containing 2 red marbles and 4 green marbles?*

**4.DASP.5.** List and count the number of possible combinations of objects from 3 sets.

*Example: With pictures of three shirts, two pairs of pants, and two hats from a catalogue, record all of the possible outfits.*